

## A NEW GENUS OF TORTRICID MOTHS (TORTRICIDAE: EULIINI) INJURIOUS TO GRAPES AND STONE FRUITS IN CHILE

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**ABSTRACT:** *Accuminulia*, new genus, is described and illustrated from Chile. The new genus includes two species: *A. buscki*, new species (type species), and *A. longiphallus*, new species. *Accuminulia buscki* has been reared from the fruit of grape (*Vitis* sp.; Vitaceae), plum (*Prunus domestica*; Rosaceae), apricot (*Prunus armeniaca*; Rosaceae), and peach (*Prunus persica*; Rosaceae) in Chile; the oldest specimen examined is an adult intercepted at the port of New York in cargo (grapes) from Chile in 1926. Several specimens of *A. buscki* have been collected recently (1983) in traps baited with *Proeulia*-lure. The new genus is assigned to Euliini on the basis of its putative phylogenetic relationship to *Proeulia* Clarke.

**Additional key words:** pest species, Neotropical, Euliini, systematics, *Vitis*, *Prunus*.

In 1926 an adult of an undescribed tortricid moth was intercepted at the port of New York in cargo (grapes) that originated from Chile. The late August Busck, a lepidopterist at the National Museum of Natural History, recognized the moth as representing a new genus and species, but did not describe it, probably owing to the lack of sufficient material. Over the 70 years since that interception, numerous specimens of the species have accumulated—both sexes, the pupa, and larval food plants now are known. A second undescribed congener also is known from Chile. This paper describes and illustrates the new genus and its two species, and presents information on the biology of one of them.

### MATERIALS AND METHODS

Taxonomic material was obtained from the following institutions: The Natural History Museum (BMNH), London, England; Mississippi Entomological Museum (MEM), Mississippi State, Mississippi, U.S.A.; Essig Museum of Entomology, University of California, Berkeley (UCB), California, U.S.A.; and National Museum of Natural History (USNM), Smithsonian Institution, Washington, D.C., U.S.A. Dissection methodology follows that summarized in Brown & Powell (1991). Illustrations of genitalia and wing venation were drawn with the aid of a Ken-A-Vision microprojector (model X1000-1). Forewing measurements were made with an ocular micrometer mounted in a Leica MZ12 dissecting microscope. Terminology for wing venation and genitalic structures follows Horak (1984). Abbreviations and symbols are as follows: FW = forewing; HW = hindwing; DC = discal cell; n = number of specimens examined;  $\bar{x}$  = mean; ca. = circa (approximately).

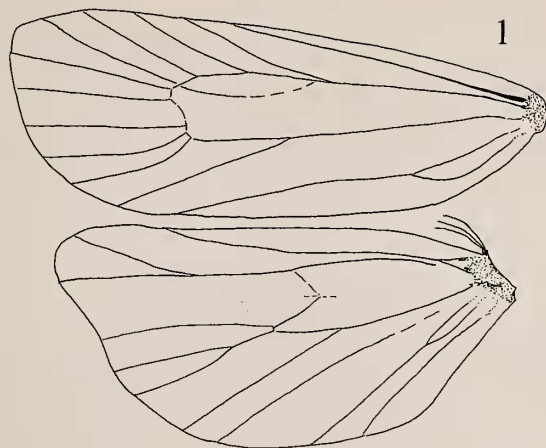
### SYSTEMATICS

#### *Accuminulia* J. Brown, new genus

**Type species.**—*Accuminulia buscki* J. Brown, new species.

**Description. Adult. Head:** Antennal cilia ca. 0.5–0.8 times flagellomere diameter in male, ca. 0.1 times flagellomere diameter in female. Labial palpus (all segments combined) ca. 1.5 times horizontal diameter of compound eye, segment II weakly upturned, slightly expanded distally by scaling, segment III 0.2–0.3 times as long as II, smooth-scaled, exposed. Maxillary palpus rudimentary. Dorsal portion of frons with short overhanging tuft of scales. Ocelli present. Chaetosema present. Proboscis ca. as long as segment II of labial palpus, presumably functional. **Thorax:** Smooth-scaled. Legs unmodified, male foreleg without hairpencil. **Forewing** (Fig. 1): Length ca. 1.8 times width; length of DC ca. 0.68 times FW length; width of DC ca. 0.18 times DC length;  $CuA_2$  originates ca. 0.70 along length of DC; all veins separate beyond DC; chorda weak but present; M-stem absent; CuP absent. Upraised scale tufts present (*A. longiphallus*) or absent (*A. buscki*); male without costal fold. **Hindwing:** Sc+R and Rs approximate; Rs to costa before apex; Rs and  $M_1$  stalked ca. 0.4 distance;  $M_2$  and  $M_3$  approximate;  $M_3$  and  $CuA_1$  stalked ca. 0.3 distance; CuP present; M-stem absent; tuft of hairlike scales along 1A+2A (cubital pecten), originating near base of wing; male with (*A. longiphallus*) or without (*A. buscki*) modified sex scaling on basal portion of wing. **Abdomen:** Dorsal pits absent; no modified corethroglyne scaling in female. **Male genitalia** (Figs. 2–3): Uncus simple, rodlike, weakly curved. Socius moderate in size, ca. 0.7 length of gnathos arms, pendant, rounded; not fused to gnathos. Gnathos complete, arms narrow, joined distally into expanded triangular plate with densely spined venter. Subscaphium and hamuli absent. Transtilla a moderately broad, arched plate, with a sclerotized posterior band bearing a dense row of short, fine, spinelike teeth. Valva moderately slender, parallel-sided, rounded apically; sacculus simple, well defined at base, without free apical process(es); costa weakly differentiated. Pulvinus absent. Vinculum complete, well developed. Juxta a sclerotized subrectangular plate with lateral pointed processes at dorsum. Aedeagus broad, moderately short, with sclerotized, attenuate, thornlike process distally; phallobase simple, rounded; vesica with variable number of mostly lanceolate cornuti. **Female genitalia** (Figs. 4–5): Papillae anales slender. Apophyses anteriores and posteriores long, slender, posteriores slightly longer. Sterigma a slender, weakly sclerotized band. Antrum large, broad, membranous, with slender, sclerotized dorsal band; accessory pouch weakly developed on right side, either as a slightly expanded area with an irregular line of sclerotization or as a triangular flap. Ductus bursae broad, moderately long, with longitudinal creases of sclerotization, twisted about two-thirds distance from antrum to junction with corpus. Corpus bursae rounded, finely punctate; signum lacking.

**Pupa** (Figs. 6–7). Description and illustrations based on reconstructions of 3 pupal shells (i.e., adults eclosed) of *A. buscki*. Typically tortricine; head without apical projection; no conspicuous sculpturing on dorsum of T3 or A1–2 (similar to *Anopina* Obraztsov and *Chileulia* Powell, and in contrast to *Dorithia* Powell and *Cuproxena* Powell & Brown); abdomen with two rows of spines dorsally on A2–7, one row on A8–9; rows on A2 well developed in con-

FIG. 1. Wing venation of *Accuminulia buscki*.

trast to that of other euliine pupae examined; cremaster short and broad, with 4 pairs of long, hooked setae. The pupa of *Accuminulia* differs from that of *Dorithia* and *Cuproxena* (both Euliini) in the following: 1) absence of ornate sculpturing on the dorsum of abdominal segments T3 and A1–2 (see Brown & Powell 1991 for comparison); 2) the anterior row of spines on the dorsum of segments A3–7 extends from spiracle to spiracle across the dorsum (in *Dorithia* and *Cuproxena* the row is restricted to approximately the middle 0.6 of the dorsum); and 3) the cremaster is short and broad compared with that of *Dorithia* and *Cuproxena*.

**Diagnosis.** Superficially, adults of *Accuminulia* are similar to *Apotomops* Powell and *Bonagota* Razowski on the basis of size and pattern of the forewing, size and shape of the labial palpus, and length of the antennal cilia. However, the only feature of the genitalia reminiscent of those two genera is the weakly developed accessory pouch in the female; a well defined accessory pouch is one of several convincing synapomorphies demonstrating the sister relationship of *Apotomops* and *Bonagota* (Brown & Powell 1991). The male genitalia of *Accuminulia* are similar to those of *Varifula* Razowski in the possession of a thornlike sclerite at the distal end of the aedeagus and a densely spined transtilla. In contrast, the facies of *Accuminulia* are remarkably dissimilar to those of *Varifula*: forewing length in *Varifula* varies from 12–15 mm, that of *Accuminulia* from 6–7 mm; forewing color and pattern in *Varifula* are simple with mostly yellow and pale tan, those of *Accuminulia* are complex, mottled gray, black, and white; and the labial palpi are extremely elongate (ca. 2.2 times compound eye diameter) and nearly porrect in *Varifula*, while short (ca. 1.5 times compound eye diameter) and weakly upturned in *Accuminulia*. Autapomorphies for *Accuminulia* include the enlarged, triangular, ventrally spined distal portion of the gnathos, the narrow, parallel-sided valvae, and the partially twisted ductus bursa.

Although documented food plants of *Accuminulia* are similar to those of *Chileulia stalactitis* (Meyrick), a Chilean species also known to feed on grapes and various *Prunus* species (see Powell 1986, Brown & Passoa 1998), the two genera have little in common morphologically.

**Etymology.** The generic name is a combination of parts of three words: “accumulate,” “in,” and “Eulia” Hübner; it is interpreted as masculine in gender.

**Phylogenetic relationships.** Based on the large, broad aedeagus with long, strong cornuti in the male and corresponding large, variably sclerotized antrum and ductus bursae of the female, *Accuminulia* appears to belong to a group of genera that includes *Proeulia*

Clarke, *Argentulia* Brown, *Varifula*, *Inape* Razowski, and *Subtranstillaspis* Razowski. *Accuminulia* shares with *Argentulia*, *Varifula*, and several species of *Proeulia* a slender, sclerotized, attenuate process along the lateral margin of the distal portion of the aedeagus. It shares with *Varifula* an extremely similar, densely spined transtilla (see Razowski 1995 for comparison). Although the spined transtilla appears to represent a convincing synapomorphy for *Accuminulia* and *Varifula*, their considerable phenotypic difference, their dissimilar cornuti, and their extremely dissimilar female genitalia shed doubt on their possible sister group relationship. Superficially, *Varifula* looks like *Proeulia*, and its female genitalia are extremely similar to those of *Argentulia*.

The assignment of *Accuminulia* to the tortricid tribe Euliini is based on the hypothesized phylogenetic relationship with *Proeulia*, which possesses the characteristic euliine foreleg hairpencil in the male (Brown 1990). The presence of a gnathos excludes it from Cochyliini, which it resembles superficially and in the possession of an extremely broad aedeagus.

#### KEY TO MALES OF ACCUMINULIA

1. Hindwing without modified sex scales in basal one-half, mostly dingy white with pale gray mottling (Fig. 8) . . . . . *buscki*
- 1'. Hindwing with basal one-half covered by modified sex scales, cream-white in contrast to pale gray-brown of remainder of hindwing (Fig. 10) . . . . . *longiphallus*

#### *Accuminulia buscki* J. Brown, new species

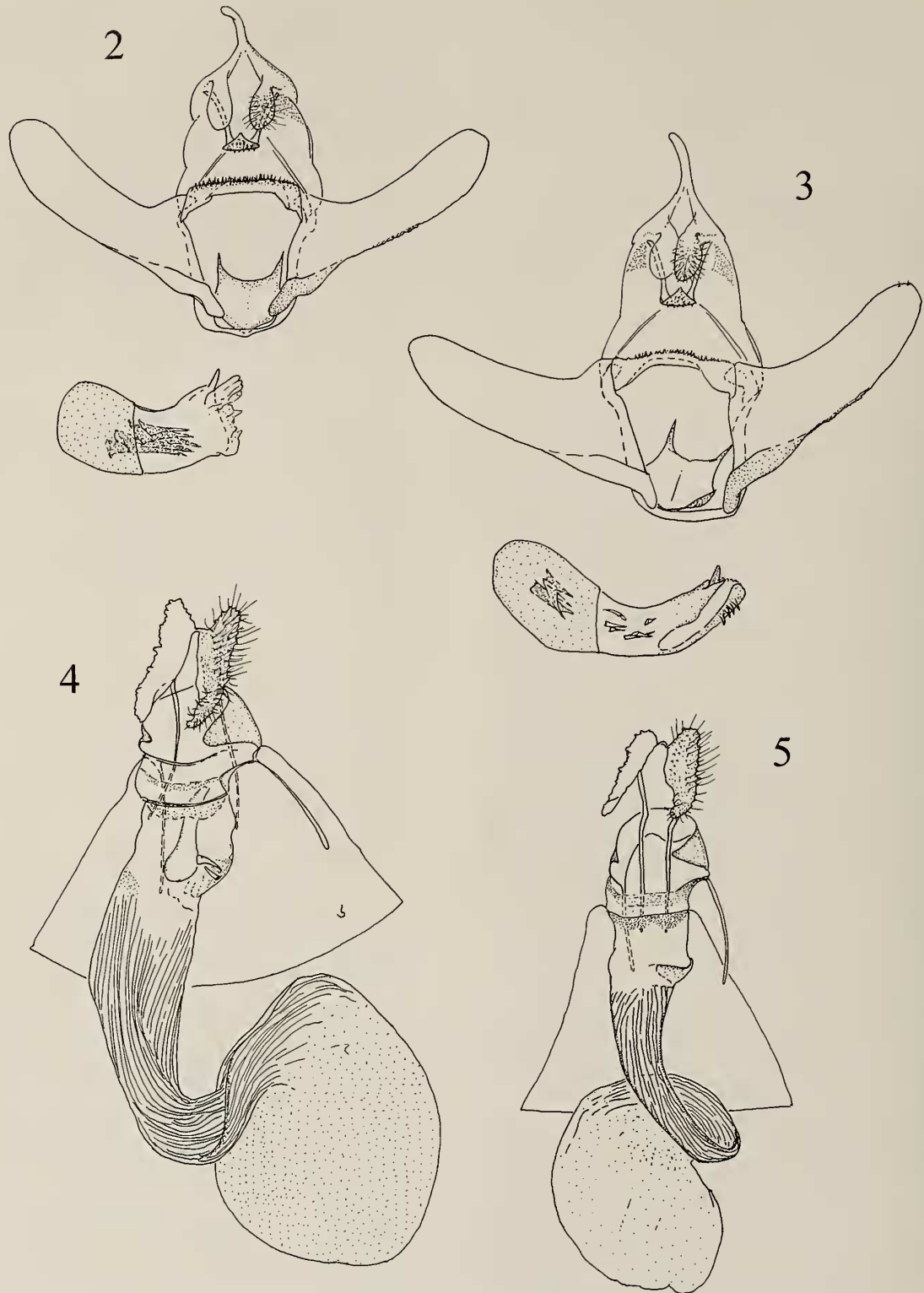
Figs. 1, 2, 5–9

**Description. Male. Head:** Frons smooth-scaled below mid-eye, whitish; roughened above, red-brown, pale yellow, and white. Labial palpus whitish yellow and brown mesally; brown mixed with tan laterally. Antennal scaling pale tan. **Thorax:** White, with brown and tan at anterior portion. **Forewing** (Fig. 8): Length 6.5–8.0 mm ( $\bar{x}$  = 6.9 mm;  $n$  = 8). Upper side whitish tan, with irregular gray, brown, and cream overscaling and irrorations; gray rhomboidal or semicircular patches at costa ca. 0.3 and 0.5 distance from base to apex; ill defined, transverse, reddish brown band in distal 0.33, bordered basally by a white band; white band well defined at dorsum, becoming less defined toward costa; small black spot at apex of DC. Under side uniform dark tan with faint indication of upperside markings. **Hindwing:** Upper side dingy white, with pale gray overscaling and mottling. Under side light gray-brown with darker mottling. **Abdomen:** Light cream. **Genitalia:** As in Fig. 2 (drawn from USNM slide 88447;  $n$  = 8). Uncus, socius, gnathos, transtilla, and valva as described for the genus. Aedeagus extremely short, broad, with 5–6 large, narrow-triangular cornuti, with broad bases.

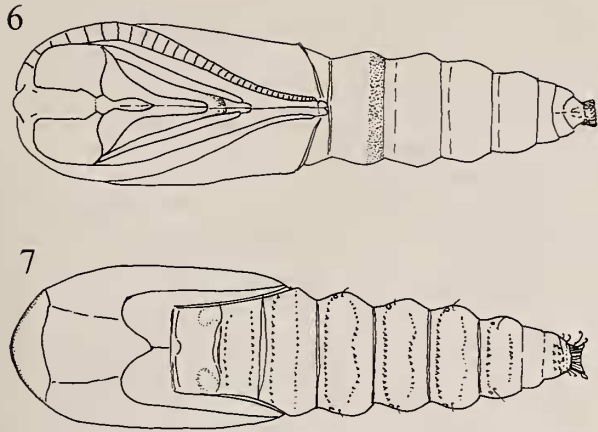
**Female.** FW length 6.0–7.0 mm ( $\bar{x}$  = 6.6 mm;  $n$  = 5). Superficially as in male (Fig. 9), except forewing with basal 0.5 mostly whitish with grayish overscaling, pattern slightly more defined; antennal cilia shorter. **Genitalia:** As in Fig. 5 (drawn from USNM slide 68618;  $n$  = 3). Essentially as described for the genus.

**Holotype.** ♂, Chile, Santiago Province, 29 Mar 1954, reared from grape (fruit), emerged 12 Apr 1954, 54-3351 (M. J. Ramsay, USNM).





FIGS. 2-5. Genitalia of *Accuminulia*; males with valvae spread, aedeagus removed. 2. Male of *A. buscki*; 3. Male of *A. longiphallus*; 4. Female of *A. longiphallus*; 5. Female of *A. buscki*.



FIGS. 6-7. Pupa of *Accuminulia buscki*. 6. Ventral aspect; 7. Dorsal aspect.

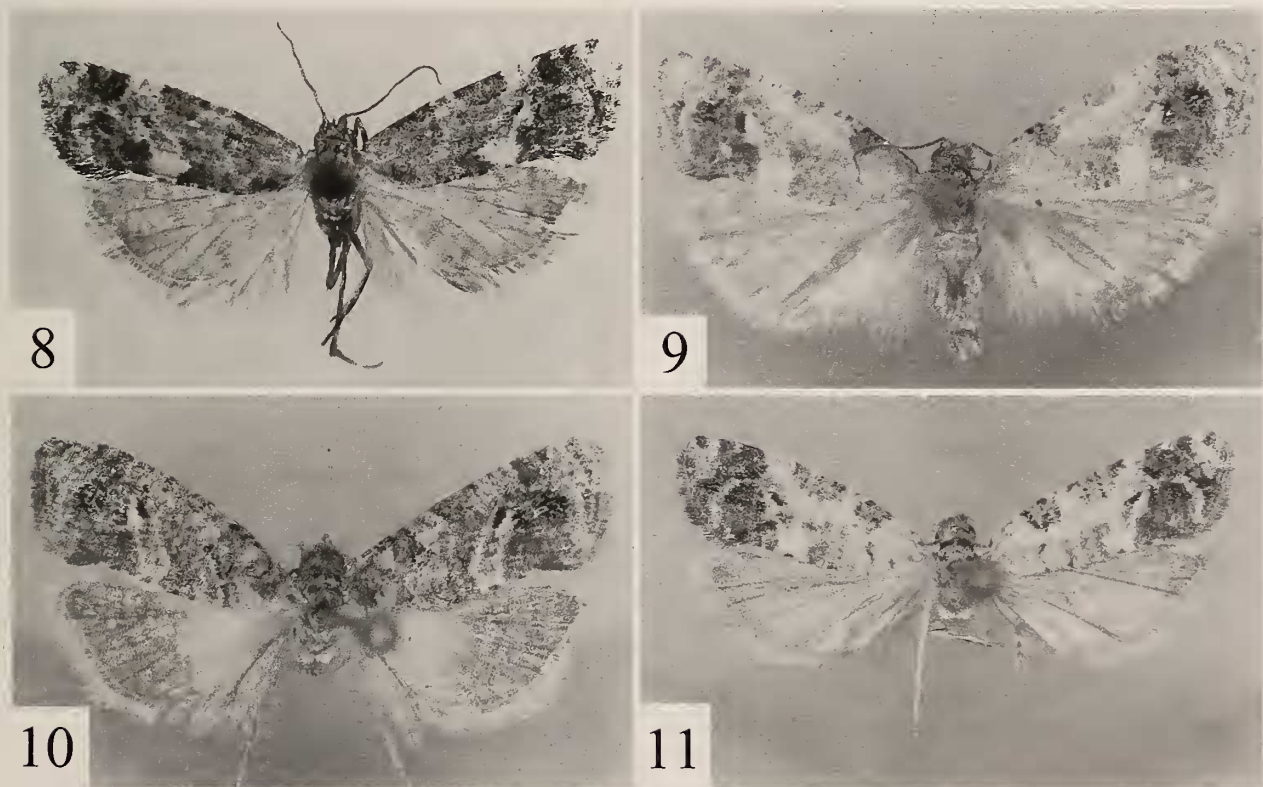
**Paratypes.** 10 ♂♂, 17 ♀♀ as follows: CHILE: *Aconcagua Province*: Los Molles, ca. 10 km S Pichidangui, 1 ♀, 15/17 Nov 1981 (D. & M. Davis, USNM). *Coquimbo Province*: Fray Jorge National Park, ca. 70 km W Ovalle, 1 ♀, 6/9 Nov 1981 (D. & M. Davis, USNM); Nague, 11 km N Los Vilos, 20 m, 1 ♀, 4/5 Nov 1981 (D. & M. Davis, USNM); Cta. Caviolen, NE Los Vilos, 5 ♀♀, 5 Feb 1986 (L. Peña, USNM); El Naranjo, S Caimanes, 1 ♀, 7 Feb 1986 (L. Peña, USNM); La Viluma, SE Melipilla, 350 m, 1 ♀, 15/17 Dec 1987 (L. Peña, USNM); Coquimbo, 1 ♂, 12 Mar/14 May 1884 (Walker 3214, BMNH). *Ñuble Province*: Alto Tresgualemu, ca. 20 km SE Chovellen, 1 ♀, 1/3 Dec

1981 (D. & M. Davis, USNM). *Santiago Province*: Santiago, 1 ♀, 5 Apr 1954, reared from grapes, 4-3161 (M. J. Ramsay, USNM), 1 ♀, 5 Apr 1954, reared from peach, 54-3165 (F. Rotundo, USNM), 1 ♀, 24 Feb 1954, reared from peach, 54-2979 (M. J. Ramsay, USNM), 1 ♀, 9 Feb 1954, reared from peach, 54-2233 (Damos, USNM), 1 ♀, 22 Mar 1954, emerged 2 Apr 1954, reared from plum (fruits), 54-3352 (M. J. Ramsay, USNM), 1 ♂, Nov 1955, reared from apricot fruit (G. Olalquiaga, USNM), 1 ♂, 17 Feb 1954, reared from peach (M. Ramsay, USNM); Santiago, ex-*Proeulia* bait, 1 ♂, 5 Sep 1983 (P. Alvarez, UCB), 2 ♂♂, 3 Sep 1993 (R. Gonzales, UCB), 1 ♂, Sep 1993 (D. Cepeda, UCB), 1 ♂, 8/12 Nov 1993 (R. Gonzales, UCB); Río Colorado, ca. 40 km SE Santiago, 1100 m, 1 ♀, 29/31 Oct 1981 (D. & M. Davis, USNM); Valparaiso, 1 ♂, 30 Sep/8 Oct 1883 (Walker 3070, BMNH). USA: *New York*: In cargo [packaged grapes] from Chile, on ship, 1 ♂, NY #57651, A. Busck gen. prep. 22 May 1926 (USNM).

**Remarks.** In the female paratype reared from grapes, the accessory pouch is considerably more developed, represented by a conspicuous triangular flap lacking sclerotization. Although it is possible that this specimen is not conspecific with the remaining series, its conformity in phenotype and all other morphological features to other specimens, in addition to its food plant, suggest that the unusual pouch represents infraspecific variation.

**Etymology.** This species is named in honor of the late August Busck, one of the most prolific early microlepidopterists at the U.S. National Museum of Natural History.

**Distribution and biology.** *Accuminulia buscki* is known only from Chile; captures range from 20 to 1100 m elevation. Specimen records suggest an adult flight period from October through April. It has been reared from the fruit of grape (*Vitis* sp.; Vitaceae),



FIGS. 8-11. Adults of *Accuminulia*. 8. *A. buscki* (male); 9. *A. buscki* (female); 10. *A. longiphallus* (male); 11. *A. longiphallus* (female).

plum (*Prunus domestica* L.; Rosaceae), apricot (*Prunus armeniaca* L.; Rosaceae), and peach (*Prunus persica* (L.) Batsch; Rosaceae). Captures in native habitat suggest that it is not an introduced pest in Chile, but a native species that has expanded its food plant range to include exotic (i.e., agricultural) plants. Although most larval Tortricinae are leaf-rollers, a few genera are known to bore into the fruit of their food plants. In Euliini these include *Proeulia* Obratzov, *Chileulia* Powell, and *Accuminulia*, all from Chile (see Brown & Passoa 1998).

*Accuminulia buscki* was first recorded as an interception at the port of New York in cargo (grapes) from Chile. Nearly all current interceptions of Lepidoptera at United States ports of entry are larvae. Because the larva of *Accuminulia* remains unknown, it is impossible to determine whether this species currently is intercepted in fruit from Chile. Because grapes from Chile routinely are fumigated at U.S. port of entry, foliage-feeding insects are eliminated (J. Cavey pers. comm.). However, larvae feeding within fruit may be unaffected by such treatments.

Recent collections (1983) of this species have come from traps baited with *Proeulia*-lure. Several species of *Proeulia* are pests of crops in Chile, including grapes, citrus, kiwis, and various stone fruits.

### *Accuminulia longiphallus* J. Brown, new species

Figs. 3–4, 10–11

**Description. Male.** *Head:* Frons smooth-scaled below mid-eye, white mixed with red-brown; roughened above, dark gray-brown. Labial palpus white and gray mesally; mostly brown laterally. Antennal scaling red-brown on scape, whitish on flagellomeres. *Thorax:* Mixed white, red-brown, and tan. *Forewing* (Fig. 10): Length 6.5–7.8 mm ( $\bar{x}$  = 7.2 mm;  $n$  = 2). Upper side mostly gray, with irregular tan, black, and cream overscaling and irroration; distal 0.25 with moderately dense red-brown overscaling; patch of upraised cream scales at dorsum near base; an irregular, lustrous white band from near middle of dorsum, terminating just basad of apex of DC; diffuse black patch of overscaling distad of termination of white line. Under side uniform dark tan with faint indication of upperside markings. *Hindwing:* Upper side with basal 0.5 covered by modified sex scaling, cream-white; patch of sex scales just below costa near base; distal 0.5 of wing pale gray-brown. Under side light gray-brown with darker mottling. *Abdomen:* Light cream. *Genitalia:* As in Fig. 3 (drawn from RLB slide 1087;  $n$  = 2). Uncus, socius, gnathos, transtilla, and valva as described for the genus. Aedeagus comparatively long, curved in distal 0.4, with a patch of 4 short, external teeth near tip; 10–12 short, spinelike cornuti in vesica.

**Female.** FW length 6.1 mm ( $n$  = 1). Superficially as in male (Fig. 11), except forewing mostly whitish in basal 0.5; antennal cilia shorter. *Genitalia:* As in Fig. 4 (drawn from RLB slide 1085;  $n$  = 1). As described for the genus, except accessory pouch poorly defined, represented by a pair of spinelike sclerites (possibly deciduous cornuti?).

**Holotype.** ♂, Chile, Santiago Province, 6 km W Tiltil, 15 Dec 1982 (R. L. Brown, MEM).

**Paratypes.** 1♂, 1♀ as follows: CHILE: 1♂, same data as holotype. Aconcagua Province: 10 km E San Felipe, 1♀, 14 Dec 1982 (R. L. Brown, MEM).

**Etymology.** The specific epithet refers to the comparatively long aedeagus of this species.

**Distribution and biology.** *Accuminulia longiphallus* is known only from Chile. It has been recorded only from Santiago and Aconcagua, provinces in which *A. buscki* also has been collected. Nothing is known of the biology; the three adults were collected in December.

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